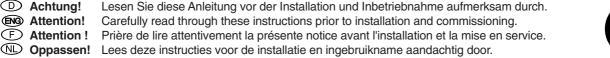


Ein Unternehmen der Metabo-Gruppe

- Betriebsanleitung (D)Schweißgeräte mit stufenloser Regelung
- **Operating Instructions** (ENG) Welding Transformers and Rectifiers with Stepless Current Control
- Instructions d'utilisation F Appareil de soudure avec réglage en continu
- Handleiding (NL) Lasapparaten met traploze instelling

SB 160 C / SB 200 CT



English only





D DEUTSCH

KONFORMITÄTSERKLÄRUNG

Wir erklären in alleiniger Verantwortlichkeit, daß dieses Produkt mit den folgenden Normen übereinstimmt* gemäß den Bestimmungen der Richtlinien**.

F FRANÇAIS

DECLARATION DE CONFORMITE

Nous déclarons, sous notre seule responsabilité, que ce produit est en conformité avec les normes ou documents normatifs suivants* en vertu des dispositions des directives ***

IT ITALIANO

DICHIARAZIONE DI CONFORMITÀ

Noi dichiariamo sotto la nostra esclusiva responsabilità che il presente prodotto è conforme alle seguenti norme*. in conformità con le disposizioni delle normative **

PT PORTUGUÊS

DECLARAÇÃO DE CONFORMIDADE

Declaramos sob nossa responsabilidade que este produto está de acordo com as seguintes normas*.de acordo com as directrizes dos regulamentos **

FIN SUOMI

VAATIMUKSENMUKAISUUSVAKUUTUS

Vakuutamme, että tämä tuote vastaa seuraavia normeja*.on direktiivien määräysten mukainen**

DA DANSK

OVERENSSTEMMELSESATTEST

Hermed erklærer vi på eget ansvar, at dette produkt stemmer overens ed følgende standarder*. iht. bestemmelserne i direktiverne**

EL EAAHNIKA

ΔΗΛΩΣΗ ΑΝΤΙΣΤΟΙΧΕΙΑΣ

Δηλώνουμε με ιδία ευθύνη ότι το προϊόν αυτό αντιστοιχεί στις ακόλουθες προδιαγραφές* σύμφωνα με τις διατάξεις των οδηγιών**

ENG ENGLISH

DECLARATION OF CONFORMITY

We herewith declare in our sole responsibility that this product complies with the following standards* in accordance with the regulations of the undermentioned Directives**

NL NEDERLANDS

CONFORMITEITSVERKLARING

Wij verklaren als enige verantwoordelijke, dat dit product in overeenstemming is met de volgende normen* conform de bepalingen van de richtlijnen**

ES ESPAÑOL

DECLARACION DE CONFORMIDAD

Declaramos bajo nuestra exclusiva responsabilidad, que el presente producto cumple con las siguientes normas*.de acuerdo a lo dispuesto en las directricee**

SV SVENSKA

FÖRSÄKRAN OM ÖVERENSSTÄMMELSE

Vi försäkrar på eget ansvar att denna produkt överensstämmer med följande standarder*. Enligt bestämmelserna i direktiven**

NO NORGE

SAMSVARSERKLÆRING

Vi erklærer under eget ansvar at dette produkt samsvarer med følgende normer*. henhold til bestemmelsene i direktiv**

POL POLSKI

OŚWIADCZENIE O ZGODNOŚCI

Oświadczamy z pelną odpowiedzialnością, że niniejszy produkt odpowiada wymogom następujących norm*.według ustaleń wytycznych **

HU MAGYAR

MEGEGYEZŐSÉGI NYILATKOZAT

Kizárólagos felelősségünk tudatában ezennel igazoljuk, hogy ez a termék kielégíti az alábbi szabványokban lefektetett követelményeket*.megfelel az alábbi irányelvek előírásainak**

SB 160 C - SB 200 CT

* EN 50060; EN 55014 (1993); DIN EN 61000-4-1 (1993), EN 60974-1 ** 89/336/EWG, 73/23/EWG

Dipl. Ing. Jürgen Kusserow

Vorstand

(

ELEKTRA BECKUM AG – Daimlerstraße 1 – 49716 Meppen

Tel.: +49 59 33 80 20



Contents

- 1 Specifications
- 2 Taking a Single-Phase Machine Into Operation
- 2.1 Taking a Combination 1-Ph/2-Ph Machine into Operation
- 3 General Information for Welding Transformer/Rectifier Operators
- 3.1 Overview of Stick Electrodes and their correct Use
- 3.1.1 Care of Stick Electrodes
- 3.1.2 Function of the Stick Electrode Coating
- 3.1.3 Classification of Stick Electrodes according to DIN 1913
- 3.1.4 Selecting Suitable Electrodes for a Welding Task
- 3.1.5 Arc Starting and Arc Burning
- 3.1.6 Welding Positions According to DIN 1921
- 4 Welding Hints
- 4.1 Weld Types
- 4.2 Weld Flaws and possible Causes Shown on Fillet Welds
- 5 Accessories and Accessory Maintenance
- 6 Wiring Diagrams

You have bought a high-quality electric arc welding machine, designed and built by specialists with many years of experience. A machine built to last, giving a long service life.

All models have the correct size power supply cable fitted, the transformer's core is made from top-quality insulated sheet steel, to keep eddy currents and cyclic magnetization losses to an absolute minimum.

Please read the instructions given in the manual in order to fully utilize the potential of your machine.

Know and adhere to all local safety codes and regulations governing the operation of electric arc welding machines.

User Responsibility

The operation of the welding divice in the data processing system environment is not allowed!

This product shall only be used as specified. Any other use requires the written consent of Elektra Beckum AG, P.O.Box 1352, D-49703 Meppen, Germany

Please contact your dealer for any warranty claims.

Warranty work will essentially be carried out by service centres authorised by us. Repairs beyond the warranty period may be carried out only by our authorised service centres.

Please preserve all repair invoices! We reserve the right to make technical changes!

We recommend attending a welding course at a recognised technical institute.

1 Specifications

opoomodiiono			
Model	SB 160 C	SB 200 CT	SB 200 CT
Main voltage	230/400 V	240 V	230/400 V
Mains frequency	50/60 Hz	50 Hz	50/60 Hz
Welding steps	stepless	stepless	stepless
Stepless at 230 V	32 - 38 V	47 - 55 V	31 - 39 V
Stepless at 400 V	38 - 46 V		41 - 50 V
Max. OCV at 230 V	16 A time-lag	32 A time-lag	16 A time-lag
Max. OCV at 400 V	16 A time-lag		20 A time-lag
Insulation class	Н	Н	Н
Protection class	IP 21	IP 21	IP 21
Setting range, stepless 230 V	30 - 110 A	70 - 180 A	20 - 110 A
Setting range, stepless 400 V	65 - 155 A		60 - 180 A
Cooling	self	fan	fan
Weldable electrodes at 230 V	Ø 1.6 - 2.5 mm	Ø 2,0 - 4,0 mm	Ø 1.6 - 2.5 mm
Weldable electrodes at 400 V	Ø 2.0 - 3.25 mm		Ø 2.0 - 4.0 mm

2 Taking a Single-Phase Machine into Operation

This machine is to be connected to the power mains via a Earth Fault Circuit Interrupter of 30 mA capacity. Worn or damaged power cables should be replaced immediately by a qualified electrician.

Do not operate this machine with a damaged power cable, danger of personal injury by electric shock. Children are not permitted to operate this machine.

Connect to an earthed single-phase 230/240 V outlet, protected by a 16 A time-lag fuse. Operating other electric machines or appliances on the same circuit while welding is only possible to a very limited extent and not recommended.

Earth and welding cable are firmly attached to the machine.

Polarity does not matter with AC welding current.

Attach earth clamp to the workpiece, close to the weld seam and on bare metal for good conduction.

Place stick electrode into the electrode holder.

With the handwheel select the desired welding current.

If there is not power outlet near the work area an extension cable is required. The cable's lead cross section must be at least 2.5 mm². Uncoil extension cable fully to prevent heatbuild-up by inductance. Inductance also conside-rably reduces the welding current. Extension of the welding cables is also possible, but the cross section of the extension cables must be larger than that of the cables supplied with the machine.

Every machine is protected against overloads by a thermo switch, which switches the power to the transformer off if it becomes too hot. After a short cooling-down period the machine will switch back on automatically. Model SB 200 CT is equipped with a fan for forced cooling, given better performance with a higher duty-cycle.

3 General Information for Welding Transformer/Rectifier Operators

Dust, dirt and metal chips will harm any welding machine. It is of particular importance that the air ventilation for cooling is not obstructed.

A weld should join two work pieces as if they were made from a single piece. Prior to the welding the joints must be cleaned and dirt, rust, grease and paint removed. Also slag from previous welds must be completely removed. Attach earth clamp firmly to work piece, assuring good metal to metal contact. Check that all cables and connectors are in proper operating condition to ensure proper current conduction.

Place electrode with the uncoated end into one of the electrode holder's notches. Each welding machine is supplied complete with an accessory kit, comprising the welding cables, a welding visor and a slag hammer. When removing slag it is recommended to protect the eyes by suitable means (goggles) from injury by sharp and hot slag. The welding visor's dark glass plate protects the eye against ultra-violet and infrared rays. The clear glass plate protects the dark plate against spatters and damage. The dark protective glass is available in different shades for different types of electrodes and to suit different eye sensivity. Normally for electrodes from 1.5 mm to 4 mm Ø protective glasses of shade DIN 9 are used, for electrode over 4 mm Ø shade DIN 10. Select the correct welding current as shown below:

Current (A)	Electrode Ø	Material Thickness
25 - 50	1.0 - 2.0 mm	1.0 - 2.0 mm
50 - 100	2.0 - 2.5 mm	2.0 - 4.0 mm
100 - 140	2.5 - 3.25 mm	4.0 - 8.0 mm
140 - 220	3.25 - 5.0 mm	8.0 - 12.0 mm
220 - 300	5.0 - 6.0 mm	12.0 - 20.0 mm

In principle do not use too thick an electrode. As a general rule calculate 40 amps welding current per 1 mm of electrode diameter. Depending on electrode type, material thickness and weld position this calculated value may have to be adjusted to plus or minus. All machines work well with thin plate from 1.0 mm thickness.

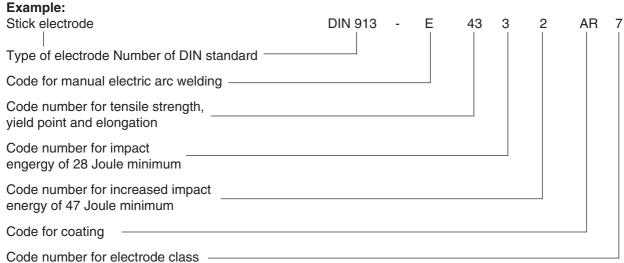
3.1 Care of Stick Electrodes and their correct Use

In order to achieve a good weld the electrode has to be dry, thus storing in a dry place is essential- Should electrodes have become moist, dry in an oven at between 200° C to 300° C for 30 minutes.

Basic coated low-hydrogen type electrodes <u>always</u> require pre-drying at 200° C to 300° C for 3 hours as atomic hydrogen causes weld flaws.

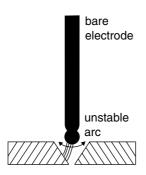
The designation of welding electrodes is standardized by DIN 1913. The designation is stipulated by the electrode manufacturers in accordance with the standard and checked by an inspection body. It is printed on the electrode packet.

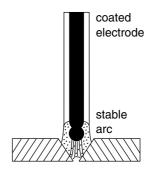
3.1.1 Coding of Stick Electrodes according to DIN 1913



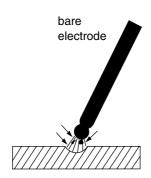
3.1.2 Function of the Stick Electrode Coating

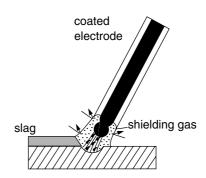
Stabilization of the arc and Ionization of the arc space





Protection of the weld metal from atmospheric oxygen and nitrogen





This protection is achieved by the generation of shielding gases and slag during the melting of the electrode.

Compensation of alloy burn-off.

Stick Electrodes According to DIN 1913

Coating thickness light medium heavy $D = 1.2 \cdot d$ $D > 1.55 \cdot d$ $D > 1.2 \cdot d$ but $\leq 1.55 \cdot d$ **Material transfer** Gap bridging ability Weld seam appearance Penetration depth

Types of Coating

Α

R rutile light and medium coating

rutile heavy coating RR AR rutile acid coating cellulose coating С

acid coated

R(C) RR(C) В B(R) RR(B)

rutile cellulose medium coating rutile cellulose heavy coating

basic coating

basic coating with non-basic proportions

rutile basic heavy coating

3.1.3 Classification of Stick Electrodes according to Table 3 of DIN 1913

	_		
Grade	Stick Electrode	Coating	Weld
	Type	Thickness	Position
2	A 2	light	1
	R 2	ligiti	•
3	R 3		2 (1)
3	R(C) 3	medium	1
4	C 4		-
_	RR 5		2
5	RR(C) 5		1
	RR 6		2
6	RR(C) 6		1
	A7		
7	AR 7	books	0
	RR(B) 7	heavy	2
8	RR 8		
0	RR(B) 8		
	B 9		1
9	B(R) 9		
10	B 10		2
10	R(R) 10		۷
11	RR 11	/high	
11	AR 11	(high-	4 (3)
12	B 12	performance	. (0)
12	B(R) 12	electrodes)	

Code for Welding Position according to Table 4 of DIN 1913

Code	Weld Position	Code Letter For
		Welding Position
1	all	w, h, hü, s, f, q, ü
2	all except vertical-down	w, h, hü, s, q, ü
3	gravity position	w
	fillet weld	
	gravity position	w
	horizontal	h
4	gravity position	W

3.1.4 Selecting suitable Electrodes for a Welding Task

Component	Welding Task	Stick Electrode Type
	out-of position welding of butt and fillet welds on thin- walled extrusion	RR 6 RR 8
	horizontal or gravity position fillet welds on long beams with "a" = 5 mm	RR 11 AR 11
	gravity position double-V welds on thick plate tow bars	B 10
	out-of-position fillet welds on bracket of 10 mm thick plate	RR(B) 7 RR(B) 8
	out-of-position butt welds on pipelines	weld 1: C 4

Stick electrodes can be classified according to their coating as under:

Type Code Type Coating Characteristics	Type of Slag - Slag Removal Ability	Penetration Depth - Gap Bridging Ability	Electrode Manipula- tion	Characteristics	Weld Appearance
O Bare Electrode finely distributed arc stabilizers in the electrode material	minimal slag	shallow - excellent	more difficult to weld than any other stick electrode	very high deposition rate, minimal heat stress, little heat distortion	convex, coarsely rippled
OO Flux-Core Electrode arc stabilizers rolled into the electrode's core	minimal slag	average to deep - excellent	slightly easier to weld than bare electrodes	good deposition rate, minimal heat stress, little weld distorition, especially for root welds	convex - coarsely rippled
N Titania Oxide Type high contens of titanium oxide	porous, even slag blanket - easily removed	average - good to excellent, depending on coating thickness	weldability of fillet welds improves with increasing coating thickness	general purpose electrodes, for steels sensitive to welding conditions, for thin plate	slightly convex to flat, finely to medium-coarsely rippled
Es Acid-Coated Type high contents of heavy metal oxides	porous, even slag blanket	deep - average	weldability of fillet welds improves with increasing coating thickness	for steels sensitive to welding conditions, requires good weld preparation	flat, finely rippled
Ox Iron Oxide Type high contents of iron oxides	tight slag blanket of evenly distributed thickness - very easily	shallow - very poor	good weldability, fillet welds in gravity position only	for unalloyed low- carbon steels, requires good weld preparation	concave, very finely rippled
Kb Basic Low- Hydrogen Type high contents of calcium or other alkaline carbonates	thick slag blanket - fair	medium - good	handling requires some practice, in particular when setting electrode to and removing from weld	particularly suitable for thick plate and rigid assemblies, for high-carbon steels, for thermo steels	slightly convex, medium-coarsely rippled
Ze Cellulose Type high contents of organic components	minimal, often quickly solidifying thin slag blanket - easy	deep - very good	good handling as only minimal slag, heavy fume generation	for out-of-position welding	slightly convex, rippled

In addition to the electrodes types shown in the above table there are several special types available coded SO. Cast iron electrodes, for example, fall into this class.

When buying Kb and So type electrodes make sure they are suitable for AC current. As far as the quality grades are concerned, a higher number indicates a better grade quality. For common low-carbon steels grades 7 - 9 are best suitable.

The last letter of the code shown on the stick electrode indicates the coating thickness.

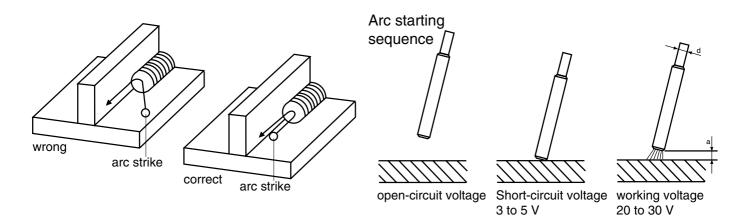
d = light coating m = medium coating s = heavy coating

3.1.5 Arc Starting and Arc Burning

Arc Strike

Always start the arc in the welding groove.

When the arc is stable weld over the arc strike and melt for good fusion, otherwise there is a risk of cracking.



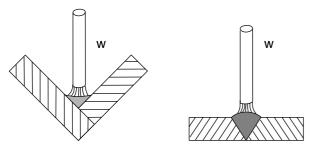
Arc Length

The arc length "a", that is the distance between the stick electrode and the work, should be:

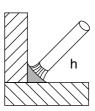
with stick electrodes of coating type R, RR, A, C = 1.0xd, with stick electrodes of coating type B = 0.5xd,

Too long an arc reduces the penetration, increases the arc blow effect and, particularly with basic coated stick electrodes, causes a porous weld seam.

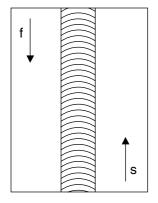
3.1.6 Welding Positions According to DIN 1921



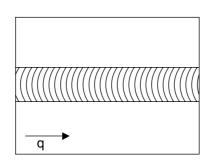
w = gravity position



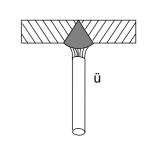
h = horizontal position



s = vertical-up position f = vertical-down position



q = horizontal-vertical position

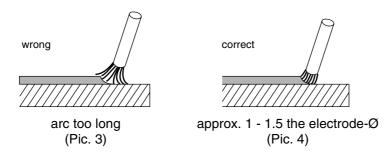


ü = overhead position

4 Welding Hints

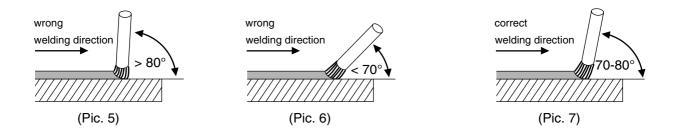
Because of the multitude of and great differences in the important points for welding only the very basic operations for the most common electrodes for low-carbon steels, the Ti-type electrode, are introduced here. In the case that other electrodes have to be used, the electrode manufacturers supply upon request all relevant information for the type of special electrode to be used.

Always make some trial welds on scrap material. Select electrode diameter and welding current as per Table 1. Attach earth clamp to work piece and place electrode into electrode holder as described earlier. Now hold the electrode tip approx. 2 cm / 1 inch above the starting point of your welding seam. Hold the welding shield in front of your face and draw the electrode with a short stroke along the groove. Through the welding shield you watch the arc, keeping it to a length of 1 to 1.5 times the electrode diameter.



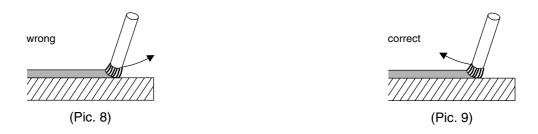
The correct arc length is important for a good weld, because with too short or too long an arc both welding current and working voltage change. A low working voltage causes insufficient penetration. Too high or too low welding current gives a poor welding seam. Too long an arc does not sufficiently melt the parent material, resulting in high spatter losses. Also the air, with its detrimental substances like hydrogen and nitrogen, may get access to the weld pool.

For a good weld the work angle of the electrode (or electrode inclination angle) is of substantial importance. The inclination should be 70° - 80° to the welding direction. With the work angle too steep slag will run under the weld pool, too flat an work angle causes the arc to spatter, in both cases the result is a porous, weak welding seam (see pictures 5 - 7).



The welder has to keep the arc at the same length, that is the electrode burn-off is compensated by feeding the electrode into the weld. At the same time the welder has to watch the weld pool for even penetration and width. Welding is always done from left to right (backhand welding).

At the end of the welding seam the electrode can not simply be lifted or pulled from the weld, this creates porous end craters, which weaken the weld. To correctly terminate a weld the electrode is held for a short moment at the end of the weld seam, then lifted in an arc over the just laid weld.



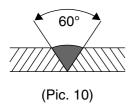
Remove slag only after it has cooled down and is no longer glowing.

If an interrupted weld is to be continued, the slag at the end of the already finished weld must be removed. Then the arc can be started either in the groove or on the weld, as described earlier, and then moved to the end of the weld, which has to be thoroughly melted for good fusion. Welding is then continued normally.

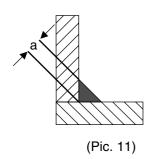
4.1 Weld Types

For **Butt Welds** the work piece edges should be bevelled to approx. 30°, which gives a groove angle of 60° (Pic. 10).

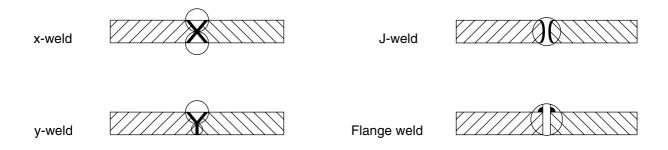
The root opening between the two work pieces should be 2 - 3 mm.



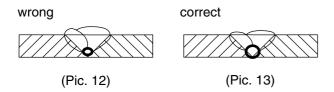
For **Fillet Welds** "a" is the throat width size. The throat width should be at least x 0.7 the plate thickness of the thinner plate.



Other weld types:

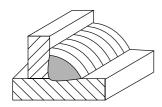


A joint weld must always have a good fusion at the root.



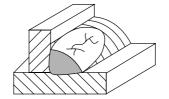
Let weld cool down in the ambient air, do not quench.

4.2 Weld Flaws and possible Causes - Shown on Fillet Welds



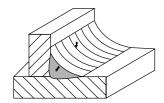
Weld Undercut

Welding current to high Electrode work angle too steep Arc too long



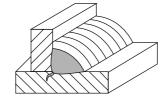
End Crater

Electrode removed too quickly from the weld pool, particularly with high welding currents risk of shrinkage cracking



Slag Inclusion

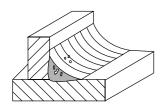
Welding current too low Welding speed to high Welding over slag on multilayer welds



Weld Toe Cracks

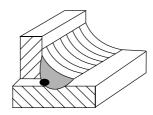
Material sensitive to welding conditions

Weld cooled down too fast after welding



Gas Inclusion

Work surface not clean (rust, grease, paint) Arc to long Basic coated electrodes not sufficiently dried



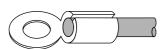
Root Flaw

Slag entering root area because distance too great

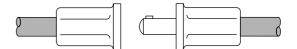
5 Accessories and Accessory Maintenance

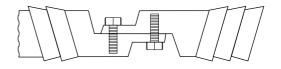
Connecting Welding Cables to the Welding Power Source





Connecting (Extending) Welding Cables

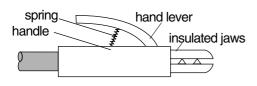




Insulate screw joint terminal with rubber bush or heatshrinkable sleeve

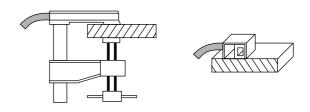
Ring tongue terminal soldered, crimped, clamped

Fully Insulated Electrode Holder



Replace broken insulating parts at once!

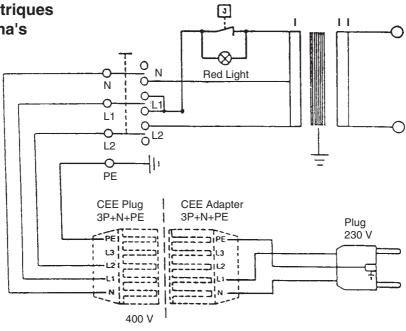
Connection of Welding Cables to the Work Piece



Clean work piece surface for good conduction

Attach earth clamp as close as possible to the weld. Structural components, beams, pipes or rails should not be used for earth conducting if they are not the actual work piece.

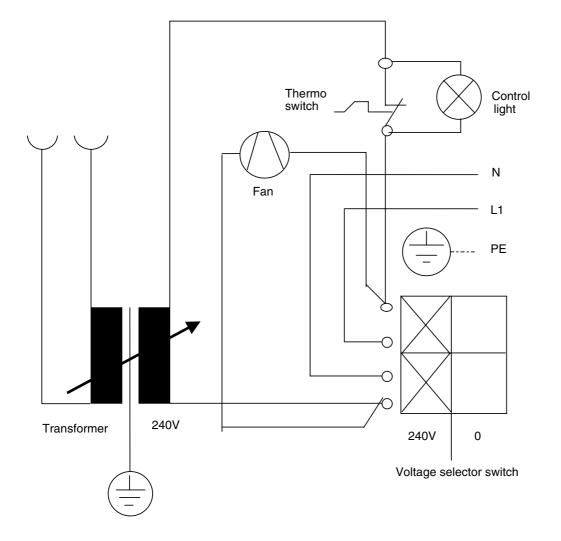
- 6 Wiring Diagrams
- 6 Schaltpläne
- 6 Schémas électriques
- 6 Schakelschema's



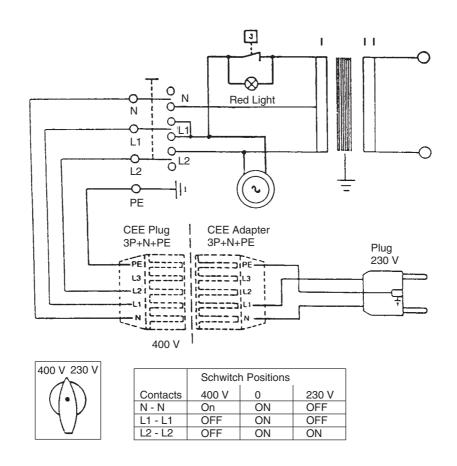


	Schwitch Positions		
Contacts	400 V	0	230 V
N - N	On	ON	OFF
L1 - L1	OFF	ON	OFF
L2 - L2	OFF	ON	ON

SB 160 C (230/400 V)



SB 200 CT (240 V)



SB 200 CT (230/400 V)

FLEKTRA BECKUM (B)

Ein Unternehmen der Metabo-Gruppe

Albania; Extra Industrial Goods; RI. Fadil Rada 88; ; Tirana; (+355) 42 - 3 30 Country; Company; Address 1; Address 2; City; Phone; Fax; E-mail

62; (+355) 42 - 3 30 62; abeqiri @t-online.de

Algerie; Haddad Equipement Professione; 98 A, Site du LycÈe; ; 16012 Rouiba; (+213) 21 - 85 49 05; (+213) 21 - 85 57 72;

Ciudadela - Buenos Aires; (+54) 11 - 44 88 - 9180; (+54) 11 - 44 88 - 39 Argentina; Metabo Argentia S.A.; Teniente Gral. Richieri 4773; ; 1702 89; info@metabo.com.ar

3179; (+61) 3 - 97 65 01 99; (+61) 3 - 97 65 01 89; sales@metabo.com.au Bahrain; AL-MAHROOS; P.O. Box 65, Manama; ; Bahrain; (+973)40 06 96; Australia; Metabo Pty. Ltd; 10 Dalmore Drive; ; Scoresby, Melbourne, Vic.

Bangladesh; East Bengal Impex; 175, Nawabpur Road (4th floor); ; Dhaka; ; (+973)40 43 23; almahros@batelco.com.bh (+880) 2 - 9 56 94 77 / 9 55 04 00;

Belgique; Metabo Belgium; ¥t Hofveld 3 - 5; ; 1702 Groot Bijgaarden; (+32) 2 Bosnia and Herzegovina; Agrarkombinat; Majevicka 1;; Banja Luka; (+387) - 4 67 32 10; (+32) 2 - 4 66 75 28; general@metabo.be

Brazil; Metabo do Brasil Ltda.; Rua Guicurus 306 - Vila Conceicao; ; 51 - 302 718; (+387) 51 - 785 708; agrokombinat@blic.net

Diadema - Sao Paulo - Cep 09911-630; (+55) 11 - 40 51 - 25 11; (+55) 11 - 4056 - 4152; metabo@metabo.com.br

Ceska Republica; Metabo s.r.o; Kralovicka 544; ; 250 01 Brandys nad Labem; (+420) 202 - 80 44 55; (+420) 202 - 80 44 56; mlanda@metabo.cz Chile; Nordchil S.A.; San Diego 895; ; Santiago de Chile; (+56) 2 - 6 72 29 11; (+56) 2 - 6 99 04 85; empresa@nordchil.cl

Costa Rica; Capris S.A.; Frente la Imprenta Nacional, La Uruca; P.O. Box 7-2400; San JosÈ; (+506) 2 32 91 11; (+506) 2 32 93 53; webmaster@capris.co.cr

Cyprus; Med Marketing Ltd. (eurotools); P.O. Box 27017; 17, Digenis Akritas Ave; 1641 Lefkosia, Cyprus; (+357) 2 - 34 95 77; (+357) 2 - 34 93 94; condam@spidemet.com.cy

Danmark; Metabo Danmark Á/S; Helgeshoj AIIÈ 12; ; 2630 Tastrup; (+45) 43 - 31 34 00; (+45) 43 - 31 34 01; scarstensen@metabo.dk

Eestlane; A/S MECRO; Peterburi tee 44; ; 11415 Tallinn; (+372) 620 11 11; Deutschland; Elektra-Beckum AG; Daimlerstr. 2; ; 49716 Meppen; 0180 - 3 33 34 56; 0180 -3 33 34 57; Ersatzteilverkauf@elektra-beckum.de

(+372) 620 11 12; mecro@mecro.ee

Egypt; EGYPTIAN ENGINEERING AGENCIES; 16 Naguib EI-Rihani Street; El Salvador; Metabo S.A. de C.V.; Colonia Santa Clara, Pasaje C No. 20; Cuscatancingo; San Salvador; (+503) 2 - 38 47 65; (+503) 2 86 52 36; Cairo; (+20)2 -25 91 32 77; (+20)2 -25 90 02 23; eea @eea.co.eg

C/Forjadores, 12; 28660 Boadilla del Monte (Madrid); (+34) 91 - 6 32 47 Espana; Herramientas Metabo S.A.; Polìgono Ind. Prado del Espino; 40; (+34) 91 - 6 32 41 47; wbuhrle@metabo.es

metabo1@telesal.net

Ethiopia; SUTCO Pvt. Ltd. Co.; P.O. Box 17924;; Addis Ababa; (+251) 1-51 27 58; (+251) 1-51 50 82; sutco@telecom.net.et

Finland; NOFA O.Y.; Hannuksentie 1; O.O. Box 28; 02270 Espoo; (+358) 9-804861; (+358) 9 - 803 9485; reijo.helenius@nofa.fi

France; LUREM MACHINES A BOIS S.A.; BP 1;;61700 Domfront; (+33)2 33 37 57 19; (+33)2 33 37 72 25;

House; P.O. Box 1783; Accra; (+233) 21 - 66 39 94; (+233) 21 - 78 02 90; Ghana; Emmnock Tradingcompany Ltd.; Knutsford. Avenue opp. Morocco

Great Britain; Metabo (UK) Ltd.; 25 Majestic Road; Nursling Industrial Estate; Southampton / SO 16 OYT; (+44) 2380 - 73 20 00; (+44) 2380 -74 75 00; info@metabo.co.uk

Suatemala; Almacen la Palma S.A.; 2a Calle 4-38, Zona 9; ; Guatemala Ciudad, 01009; (+502) 3 32 47 24; (+502) 3 32 47 81;

Hong Kong; Jebsen & Co. Ltd.; 9/F, Jebsen Motor Group Building; 924-926 celand; ASBORG S.F.; Smidjuvegi 11;; 200 Kopavogi; (+354) 5 641212; Cheung Sha Wan Road; Kowloon / Hong Kong; (+852) 29 26 22 00; (+852) 28 82 19 78; rileytam@mail.jebsen.com.hk almpalma@amigo.net.gt

Complex; Ambethan Road, Kharabwadi; Chakan, Tal.: Khed, Dist.ndia; Metabo Power Tools PVT Ltd.; Plot No. 40, WMDC Industrial (+354) 5 641135; asbord@centrum.is

82 Kencana No. 1; Meruya - Kembangan; Jakarta 11610; (+62) 21 - 582 ndonesia; P.T. Kawan Lama Sejahtera pt; Gedung Kawan Lama Jl. Puri Pune(Pin410 501); (+91) 213 - 55 22 03; (+91) 213 - 55 21 61; 82; (+62) 21 - 5 82 55 88; kawanlama@kawanlama.com

srael; Proter + Cohn Ltd; Technical Supply P.O.Box 33215 / 3; Haatzmaut Road; 33033 Haifa; (+972) 4 - 8 64 04 69; (+972) 4 - 8 67 18 03; dubovskv@matav.net.il

talia; Carlo Stechel & Figli S.rl; Via Buozzi, 22; ; 20 097 San Donato Milanese (MI); (+39) 02 - 52 77 71; (+39) 02 - 55 60 03 22 cstechel@stechel.it

Japan; Metabo Japan Co., Ltd.; 5-1024-3, Baigou, Ohme-city; ; Tokyo 198-Jordan; Newport Trading Agency; P.O.Box 6166 / 151 Hashimi Str.; City Center; Amman 111 18; (+962) 6 - 465 56 80; (+962) 6 - 464 54 39; 0063; (+81) 4 - 28 77 05 06; (+81) 4 - 28 77 05 07;

Road, Kilo 9; P.O.Box 11429; Jeddah 21453; (+96) 62 - 6 82 04 58; (+96) Kingdom of Saudi Arabia; Saudi Industrial Tools Corporation; Madinah 62 - 6 91 12 67; sitaco@sitaco.com.sa isakkab@nta.com.jo

663 SAFAT; 13007 State of Kuwait; (+965) 47 47 137; (+965) 47 47 945; Kuwait; Naser Moh. Al-Sayer; Gen. Trading & Contracting Co.; P.O. Box

Malaysia; Finetools SDN BHD; No. 7 Jalan 1/92C; Batu 3 1/4 Jalan Cheras; 56100 Kuala Lumpur; (+60) 3 - 92002966 / 92003966; (+60) 3 - 92007599; Alsayer_electro@hotmail.com

Malaysia; LINTREX (Malaysia) SON: BHD.; 68100 BATU Caves, Box S 24 Sentul; ; 51700 Kuala Lumpur; (+60)3 - 6 18 88 88; (+60)3 - 6 17 66 16; finetools@pd.jaring.my

Malta; G + T Imports Limited; Metabo Shop, Birkirkara By-Pass; ; Iklin BZN 11; (+356) 43 54 24; (+356) 41 73 58; gtimports @mail.global.net.mt Mauritanie; S.T.A.F; B.P.: 40246; ; Nouakchott; (+222) 525 33 85; (+222) 525 14 09; STAF @toptechnology.mr

Mauritius; Dema - Supplies Ltd.; 2Å Deschartres Street; ; Port Louis; (+230) 2 12 64 05; (+230) 2 10 74 57; dema@intnet.mu

Nederland; Metabo Nederland b.v.; Postbus 180;; 3620 AD Breukelen; Morocco; StÉ Yyes Rouger; 20 Bd. Ibn Tachfine; ; 20300 Casablanca; (+212) 2 31 25 06; (+212) 2 - 31 24 62;

New Caledonia; Ets. Szemmelveisz; 3, Rue Fernand Forest; Boite Postale (+31) 3462 - 6 42 44; (+31) 3462 - 6 35 54; verkoop@metabo.nl 668; 98845 NoumÈa; (+687) 27 20 02; (+687) 27 30 94;

szemmelveisz@canl.nc

Norway; Metabo Norge AS; Postboks 1296;; 3205 Sandefjord; (+47) 33 - 44 New Zealand; Tooline Limited; 50 Disraeli Street; P.O. Box 798; Christchurch; (+64) 3 - 36 55 931; (+64) 3 - 36 55 932; hamish@metabo.co.nz

Paraguai; Taguato S.A.; Avda. Gra. Santos No. 1948/Tte. Garay; ; Asuncion; (+595) 981 - 43 15 13; (+595) 21 - 33 36 77; taguato @conexion.com.py Philippines; Mach Tools Inc.; 185 A & B del Monte Avenue; ; Manresa 55 55; (+47) 33 - 44 55 50; psteingrimsen@metabo.no

Quezon City; (+63) 2 - 3 63 01 59; (+63) 2 - 3 61 48 41;

nancytanyu@speedsurf.pacific.net.ph

Polska; Metabo Polska Sp. z o.o.; Gdynska 28;; 73-110 Stargard Szczecinski; (+48) 91 - 5 78 11 95; (+48) 91 - 5 78 07 76; serwis@metabo.pl Portugal; BOLAS-Mag. e Ferramentas de Qualidade, S.A.; Rua B, Lotes 8-10-12; Apartado 53; 7000-171 Evora Codex; (+351) 266 - 74 93 00 (+351) 266 - 74 93 09: bolas@mail.telepac.pt Qatar; Gulf Incon; P.O.Box 4076; ; Doha; (+974) 4 68 35 11; (+974) 4 68 40 65; ganesh@gulfincon.com

Republic of South Africa; Metabo Power Tools SA (Pty.) Ltd.; 165 Van DER Apartado 342, Zona 9-A; Panam ; (+507) 2 23 77 05; (+507) 2 69 18 66; Rep. de Panam.; G erman-Tec (Panam.) S.A.; Via Argentina 46-70; germante@cableonda.net

Republica Dominicana; Agroindustrial Ferretera S.A.; Av. Luperon No. 42; BIJL STREET; MEADOWDALE - Germiston; Johannesburg; (+27) 11 -372 - 96 00; (+27) 11 - 453-41 63; ebotha@metabo.co.za

Santo Domingo; (+1) 809 - 531 50 80; (+1) 809 - 531 53 38; igarcia@agroindustrialferretera.com

Rumania; Agent Trade S.R.L.; Splaiul Unlrii 235-237; ; 74299 Bucuresti 3; (+40) 1 - 3 20 31 41; (+40) 1 - 3 20 31 42; agent@dial.kappa.ro

Schweiz; Metabo (Schweiz) AG; Lindauerstr. 17; ; 8317 Tagelswangen; (+41 Russia: OOO ITA-Stroiinkom: Uliza Alabiana 3: : 125057 Moskau; (+7) 095 198 43 14/198 17 13; (+7) 095 - 198 43 14; metabo_service@mail.ru

Number One Building; Singapore 408563; (+65) 7 48 28 66; (+65) 7 45 38) 52 - 3 54 34 44; (+41) 52 - 3 54 34 45; service@metabo.ch Singapore; HOMELY HARDWARE PTE LTD; No. 1 Ubi Crescent #01-01; 72; sales@homely.com.sg

South Corea; Metabo-Korea Co. Ltd.; Room No. 101, Daesung Building; 263-1 lpchung-Dong, Chung-Gu; Seoul; (+82) 2 - 22 76 09 14/5; (+82) 2 -Slovenia; Dilex d.o.o.; Ogrinceva 17; ; 1000 Ljubljana; (+386) 61 - 1 68 16 20; (+386) 61 - 1 68 16 16; metabo@dilex.si

St. Lucia; Eurotools Int'l Ltd; P.O.Box RB 2484; Rodney Bay, Gros Islet, West Indies; Santa Lucia; (+1)758 - 452-99 14; (+1)758 - 452-99 15; 2 78 62 62; kwlee@metabokorea.co.kr

Sultanate of Oman; AHMED RAMADHAN JUMA & CO.L.L.C.; P.O. 3566; Postal Code 112; Ruwi; (+968)70 31 70; (+968)70 83 05; siuma@email.com

eurotools@candw.Lc

Sverige; Metabo Sverige AB; Skifferv‰ga 6; ; 553 03 J°nk° ping; (+46) 36 10 06 60; (+46) 36 - 16 07 54; mwidell@metabo.dk

Thailand; SSM - Sri Siam Mongkol Co., Ltd; 1570-1576 Krung Kasem RD.; ; Halmstad; (+46) 35 - 154400; (+46) 35 - 104835; bo.rosenbaum@hdf.se Pomprab Bangkok 10100; (+66) 2 - 3 28 11 89; (+66) 2 - 3 28 13 04; Sverige; HDF - Bolagen AB; Svarvaregatan 5; P.O.Box 525; 30180

Tunesia; L¥cquipment Moderne; 86, Ave. de Carthage; ; 1000 Tunis; (+216) Turkey; Burla A.S.; Voyvoda Cad. 61-65;; 80003 Karak, y-Istanbul; (+90) 1 - 25 83 92; (+216) 1 - 35 18 45; equipement-moderne@planet.tn vinai@ssm.co.th

Opolcheniaya; 03 151 Kiev; (+380) 44 - 2 45 94 34; (+380) 44 - 2 45 93 Ukraine; Comservice; Ukraian-Russian Joint Venture 2; Narodnogo 212 - 2 56 49 50; (+90) 212 - 2 38 98 26; elalet@burla.com

65; comserv@ukmet.net

Jnited Arab Emirates; Sedana Trading Co; P.O. Box 1919; ; Sharjah; (+971` 6 - 533 05 51; (+971) 6 - 533 73 68; sedana @emirates.net.ae Venezuela; OLY-COPIA C.A.; 3 ra Transversal Los Ruices; Edificio Principal II, Piso 4; Caracas 1071; (+58) 212 - 2 37 30 22; (+58) 212 - 2 39

Vietnam; HUU HONG MACHINERY CO., LTD.; 157-159 Xuan Hong Street, Ward 12; Tan Binh District; Ho Chi Minh City; (+84) 8 - 811 74 54; (+84) 8 23 65; masmuss@olycopia.com

Yugoslavia; WHM WOBY HAUS MARKT; Brace Ribnikara 55; ; 21000 Novi Sad; (+38) 12 15 28 56; (+38) 12 15 24 57; woby @Eunet.yu 811 63 38; TVTLinh@hcm.fpt.vn